Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

Regional Disparities in Emergency Care based on Medical Resource and Transfer Rate

Sang-Kyu Park[1], JeeHee Kim*[2], Tai-HwanUhm[3], So-Yeon Shin[4]

[1] Department of Emergency Medical Technology, Gachon University,191, Hambakmoe-ro, Incheon, 21936,Korea

[2]Department of Emergency Medical Services, Kangwon National University,346, Hwangjo-gil, Dogye-eup, Samcheok, Gangwondo, 25949, Korea

[3]Department of Emergency Medical Services, Eulji University, 553,Sanseongdae-ro, Seongnam, Gyeonggi-do, 13135, Korea

[4]Wonkwang University Graduate School, 460,Iksandae-ro, Iksan, Jeollabukdo, 54538, Korea

ABSTRACT

The purpose of this study was to analyze disparity in emergency care based on data of the National Emergency Medical Center.The first half of 2018 statistics report on the National Emergency Department Information System(NEDIS) and the 2018 status report on patients with severe emergency diseases in 153 emergency medical centers were investigated. Mann-Whitney U test (one-tailed; α=.05) was conducted to identify difference between 8 metropolitan cities and 8 rural(suburban) areas on the number of emergency medical squads per 100000 people.The number of emergency medical centers, the number of patients with severe emergency diseases, the time of arrival at the emergency medical centers, and the transfer rate of the patients with severe emergency diseases in the emergency medical centers. In service area per emergency medical squad, the rural(suburban) areas had an average of 1842.41km^2 with a statistically significant difference(p=.001). In transfer rate, the rural(suburban) areas had an average of 5.26% with a statistically significant difference(p=.010). In primary transfer rate, the rural(suburban) areas had an average of 7.20% with a statistically significant difference(p<.001). Although service population per emergency medical squad in the rural(suburban) areas was less than half of that in the metropolitan cities, the area was nine times larger.The primary transfer rate in the rural(suburban) areas was high. This transfer of emergency patient without definitive treatment or surgery must have been negatively affected.

Keywords: National Emergency Department Information System(NEDIS); Emergency Medical Center; Metropolitan City; Rural; Suburban.

*Corresponding Author :

Name :JeeHee Kim

Email : kjh1962@kangwon.ac.kr

Contact : +82-10-4830-1922

Fax : +82-33-540-3349

Date of Submission :

INTRODUCTION

World Health Organization (WHO) Charter of Constitution clearly states that the highest possible level of health is a basic right of all humans regardless of ethnicity, religion,

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

political beliefs, or difference in economic or social conditions. Recently, the United Nations (UN) Human Rights Council has released several reports on the reduction of discrimination as a means to ensure the right to health. Korean constitution recognizes the right to healthy and pleasant environment, and Medical Law stipulates factors necessary to ensure quality healthcare for the people. Law on emergency medical care mandates timely and appropriate emergency medical care without discrimination based on gender, age, race, religion, social status, or economic situation.

However, universal right to health has not yet been established, including medical or emergency care. There have been confirmed reports of unfairness or inequality in the provision of emergency care based on race, ethnicity, status, and region. According to basic emergency medical care plan, there has been regional discrepancy in cardiovascular and neurovascular mortality rate. In 2016, cardiovascular mortality rate per 100,000 persons was 45.3 in Gyeongnam and 25.0 in Daejeon. Hence, efforts are being made to improve on healthcare discrepancy by fortifying manpower and budget for emergency medical care and allocating additional ambulances in less accessible areas and by creating accountable care organizations to strengthen accessibility to essential healthcare and intervention for the underprivileged. This is because emergency healthcare is a public domain to which market principle cannot be applied. Rather, it needs government intervention in order for balanced distribution of relative resources.

Time from patient outbreak to paramedic arrival and transfer to an emergency care facility is known to be an important factor in patient prognosis (Eisenberg MS et al., 1991; De Mario VJ et al., 2003). The Golden Time has been proposed to be a few minutes for cardiac arrest, 90 minutes for myocardial infarction, 4 hours and 30 minutes for stroke, a few minutes for acute respiratory distress, and 1 hour for trauma. There has been a study that exposed inappropriate management of time to hospital transfer based on the evaluation of emergency patient, but it did not provide comparison between regions (Cone DC et al., 2003; Gonzalez RP et al., 2006). In order for timely provision of first aid before transfer to hospital, first-aid education for non-medical personnel as well as ambulance deployment within a certain distance are needed. For timely provision of hospital emergency service, a level I emergency care center should be designated in each region (Gonzalez RP et al., 2009; Jennings PA et al., 2006).

In rural areas, deployment of emergency care resources is limited due to the relatively low frequency of emergency patients. It is difficult to improve on the treatment results unless ample resources are deployed, since ambulances and emergency centers are far apart due to the low population density, and intervention capacity is also compromised. As a result, emergency care and the treatment result in rural areas are limited. This is because emergency care resources have been distributed in response to the frequency of emergency patient outbreak (Gonzalez RP et al., 2009; Jennings PA et al., 2006). This study analyzes the discrepancy in emergency healthcare resources and emergency patient transfer between metropolitan cities and rural-suburban areas and aims to contribute to the improvement of the inequality in emergency healthcare service.

MATERIALS AND METHODS

Subject

2018 1st half National Emergency Department Information System (NEDIS) statistics report, 2018 severe emergency patient presentation report, 2018 emergency medicine statistics report, and 2018 National Fire Agency report were obtained from National

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

Emergency Medical Center and National Fire Agency websites between Oct. 28, 2019 and Oct. 31, 2019. These reports have been selected because they are released in the same format every year based on official national statistics and are highly reliable. Furthermore, information appropriate for this study can be extracted among many statistical reports based on the need of the investigators.

Study design

Emergency patients who have presented to 41 regional emergency medical centers and 112 local emergency medical centers as designated by Emergency Medicine Law were analyzed to compare 8 metropolitan cities and 8 rural-suburban areas (based on address) (Ministry of Government Legislation, 2019). Gyeonggi-do was included in the metropolitan group due to its proximity to Seoul and advanced urbanization with increasing population density.

Page 73 of the 2018 Emergency Medicine Statistics Report by National Emergency Medical Center on the number of paramedic teams per 100,000 was analyzed to compare the population allocated to one paramedic team. Allocated area per paramedic team was calculated based on 2018 urban planning report by Ministry of Land, Infrastructure, and Transport on use district designation. 2018 National Fire Agency report was used to collect additional data on 119 emergency team status and fire station construction status.

Page 88 of the 2018 National Emergency Department Information System (NEDIS) statistics report on the time to arrival at emergency department after presentation was analyzed to compare the two areas. The arrival rates were calculated by dividing the number of patients arriving within 30 minutes, 2 hours, and 4 hours by the number of emergency patients per area.

2018 Severe Emergency Patient Presentation Status Report on the composition of severe emergency cases was used to compare the number of emergency centers and severe emergency cases between the two areas. Page 63 of the same report was used to investigate the number of transfers of severe emergency cases, to investigate the number of primary transfers of severe emergency cases, and to investigate the number of re-transfers of severe emergency cases. The three transfer rates were calculated by dividing the total number of severe emergency cases divided by the number of transfer cases

Data analysis

Data were analyzed with SPSS 21.0 for Windows (IBM Inc, New York, USA). Arrival and transfer rates were expressed in percentage (%), and continuous variables were expressed in mean and standard deviation. In order to analyze the difference between the two regions in the number of paramedic teams per population and area, time to arrival at emergency center, number of emergency care facilities and severe emergency patients, transfer of severe emergency patients, Mann-Whitney U test was performed with significance level of α=.05 (independent sample; one-sided test).
G*Power (v 3.1.9.4; Universität Kiel, Kiel, Germany) was used for post-hoc analysis to confirm statistical power.

RESULTS AND DISCUSSION

Table 1 shows the comparison between metropolitan and rural-suburban areas in the population size and area allocated to a paramedic team. Area per paramedic team(km2) of metropolitan city was 190.85km^2 and that of urban and suburban was 1842.41km^2(in Table 1).

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

It is found that only 12 features are most relevant to the task of student dropout prediction out of original number of 31 features collected through questionnaire as seen in Table 1. Then the ID3 and improved decision tree algorithm is employed on selected subset of features and record using 10 fold cross validation. Attribute with highest information gain is used as a root node. The dropout dataset is classified into two groups Yes and no based on the confusion matrix for Improved Decision Tree was constructed shows accuracy percent 92.50 for ID3 and 97.50 for improved Decision Tree. It indicates that improved decision tree is the best classifier for predicting the student who will dropout or not at the university.

Table 2 showed the comparison between metropolitan and rural-suburban areas in the population size and area allocated to a paramedic team.The patient per center was 5346.5 persons in metropolitan city and that of urban and suburban was 4642.9 persons (in Table 2).

Table 3 showed the comparison between metropolitan and rural-suburban areas in the time to arrival at emergency center (in Table 3).

Table 4 revealed the comparison between metropolitan and rural-suburban areas in the transfer rates of severe emergency patients (in Table 4).

Based on the analysis of data from National Emergency Medical Center, there was discrepancy in emergency care landscape between metropolitan and rural-suburban areas. Though the size of population allocated to a rural paramedic team was less than half that of metropolitan teams, the area allocated was 9 times larger. There were 102 emergency medical centers in metropolitan areas and 51 in rural-suburban areas. Rapid accessibility should be guaranteed in low population density areas by increasing emergency care resources.

Fortunately, there was no difference in the time to arrival at emergency medical center between the two areas, probably due to various factors such as distance travelled by paramedic team, road condition, and traffic condition (Morel S, 2009). This is because, in rural-suburban areas, the distance travelled by paramedics is greater, but there is less traffic. Since the statistics report does not include dispatch time based on the emergency care log and, therefore, does not allow for minute-by-minute analysis, the significant difference between the two groups within 30 minutes probably occurred due to the difference in the allocated area. It can also be deduced that the transfer time was shortened due to the shorter distance, since cities were included in the rural-suburban areas (Pattanarattanamolee R et al., 2017).

Particularly for severe emergency cases, pre-hospital treatment by paramedics and emergency treatment at the emergency medical center should be provided early. For myocardial infarction, stroke, severe trauma as well as cardiac arrest, possibility of residual disability is great even if the patient survives. With wider prevalence of medical helicopter dispatch, there is some support for the discrepancy in transfer time between metropolitan and rural-suburban areas. However, there are still many issues with ambulance transfers, and a recent study has shown that emergency transfers are still inadequate (Ray AM et al., 2009). On-site activity time was the longest for non-responsive patients, and the standard response of completing initial evaluation, first-aid, and preparation for transfer within 10 minutes with subsequent transfer to an emergency center capable of definitive therapy was not met. Such situations delay definitive in-hospital therapy and has negative impact on

patient prognosis (Uhm TW et al., 2018). In order to lower the transfer rate, appropriateness of a transfer center for each patient should be evaluated for quality control (Williams JM et al., 2001; Yng NY, 2014). Through such measures, inter-regional discrepancy can be reduced.

The fact that there are, on average, 700 less severe emergency cases in a rural/suburban emergency care center may hinder investment and weaken the functionality of an emergency medical center, thereby increasing the transfer rate. Fortunately, national investment for areas of emergency care weakness will be deployed to designate and support regional accountable medical institutions. Policies to reduce primary transfer rate in rural-suburban areas should also be enforced concurrently, since high transfer rate signifies greater number of emergency patients transferred to another center without timely treatment, which leads to delay in treatment and worse prognosis.

As mentioned earlier, it is possible that the inadequate emergency care facility in the rural-suburban areas mandates transfer to a regional center. In response to this issue, the target center should be identified and designated at the time of on-site transfer, and support for local emergency medical centers should be fortified to enable definitive treatment and surgery within the designated area. The lack of discrepancy in the time to arrival at the emergency medical center may be a reflection of improvement in healthcare inequality. However, in order to assess the appropriateness of transfer and emergency treatment for severe emergency cases, we must first confirm the time to definitive therapy or surgery at a local level.

This study is limited by the use of prior statistical reports as raw data, especially since the data did not allow for minute-by-minute comparison or comparison at the level of local government authorities. As the data targeted a limited number of regional government authorities, non-parametric statistics had to be used. However, the statistical power was shown to be 80-55%, showing above average power.

CONCLUSION

Discrepancy in emergency medical care resources and emergency patient transfer was confirmed. In rural-suburban areas, emergency care resources were distributed across a larger area, and transfer rates were higher with subsequent delay in emergency care, compared to metropolitan areas. National Fire Agency must apply directives strictly to transfer emergency patients to available emergency centers. Ministry of Health and Welfare must fortify support and designate additional local emergency medical centers for rural-suburban areas. National and local government authorities should decrease the inequality between regions by enabling timely and adequate emergency care within a certain area.

REFERENCES

1. Cone, DC, Richardson, LD, Todd, KH, Betancourt, JR, and Lowe, RA, 2003. Health care disparities in emergency medicine. AcadEmerg Med, 10(11), 1176-1183. DOI: 10.1111/j.1553-2712.2003.tb00600.x
2. De Mario, VJ,Stiell, IG, Wells, GA, andSpaite, DW, 2003. Optimal defibrillation respo nse intervals for maximum out-of-hospital cardiac arrest survival rates. Ann Emerg Me d, 42(2), 242-250. DOI: 10.1067/mem.2003.266
3. Eisenberg, MS, Cummins, RO, and Larsen, MP, 1991. Numerators, denominators, and survival rates: reporting survival from out-of-hospital cardiac arrest. Resuscitation, 9, 5

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

44–546. DOI: 10.1016/0735-6757(91)90108-V

4. Gonzalez, RP, Cummings, GR, Mulekar, MS, andRodning, CB, 2006. Increased mortality in rural vehicular trauma: identifying contributing factors through data linkage. J Trauma, 61, 404-409. DOI: 10.1097/01.ta.0000229816.16305.94
5. Gonzalez, RP, Cummings, GR, Phelan, HA, Mulekar, MS, andRodning, CB, 2009. Does increased emergency medical services prehospital time affect patient mortality in rural motor vehicle crashes? A statewide analysis. The American Journal of Surgery, 197(1), 30-34. DOI: 10.1016/j.amjsurg.2007.11.018
6. Jennings, PA, Cameron, P, Walker, T, Bernard, S, and Smith K, 2006. Out-of-hospital cardiac arrest in Victoria: Rural and urban outcomes. Medical Journal of Australia, 185(3), 135-139.
7. Morel, S, 2019. Inequality and discrimination in access to urgent care in France: Ethnographies of three healthcare structures and their audiences. Social Science & Medicine, 232, 25–32. DOI: 10.1016/j.socscimed.04.028
8. Pattanarattanamolee, R, Lertsinudom, S, Nakahara, S, and Sakamoto, T, 2017. Ambulance crash in a rural area of Thailand. The Journal of Emergency Medicine, 53, 730–734. DOI: 10.1016/j.jemermed.2017.08.017
9. Ray, AM, andKupa, D., 2009. Comparison of rural and urban ambulance crashes in Pennsylvania. Prehospital Emergency Care, 416-420. DOI: 10.1080/10903120701536966
10. Uhm, TH, and Park, SK, 2018. Evaluation of patient transportation and response intervals among emergency medical squads. Korean J Emerg Med Ser, 22(3), 47-54. DOI: 10.14408/KJEMS.2018.22.3.047
11. Williams, JM., Ehrlich, PF, and Prescot, JE, 2001. Emergency medical care in rural America. Annals of Emergency Medicine, 38(3), 323-327. DOI: 10.1067/mem.2001.115217
12. Yng. NY. (2014). Optimal use of emergency services. The Singapore Family Physician, Supplement, l40(1), 8-13.

Table 1: Comparison between metropolitan and rural-suburban areas in the population size and area allocated to a paramedic team

Type*	Area	Paramedic per 100,000**	Area per paramedic team(km^2)
Metropolitan Cities	Seoul	1.5	17.3
	Incheon	2.3	96.4
	Gyeonggi	1.8	432.5
	Busan	1.9	99.4
	Daegu	2.0	147.3
	Gwangju	2.1	71.6
	Daejeon	2.1	90.0
	Ulsan	2.2	572.3
	Mean (SD)	1.99(0.25)	190.85(199.14)
	Rank	4.50	4.75
Rural/suburban	Gangwon	7.8	2414.6
	Chungbuk	4.1	1851.7

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

	Chungnam	4.7	1093.0
	Jeonbuk	4.2	1016.4
	Jeonnam	5.0	3858.6
	Gyeongbuk	5.0	2125.4
	Gyeongnam	3.9	1969.3
	Jeju	4.6	410.3
	Mean (SD)	4.91(1.24)	1842.41(1054.48)
	Rank	12.50	12.25
U		0.0	2.0
P		<.001	.001
1-β		80	66

* 'Metropolitan Cities' include designated metropolitan cities and the province of Gyeonggi. Rural-suburban areas are defined by areas other than the aforementioned areas.
** As of 2017, 9772 paramedics and 1384 ambulances are distributed across 1029 119 safety centers.

Table 2: Comparison between metropolitan and rural-suburban areas in the population size and area allocated to a paramedic team
N=153, 760229

Type*	Area	Emergency facilities**	Severe emergency patients***	Patients per center
Metropolitan Cities	Seoul	35	167795	4794
	Incheon	12	59316	4943
	Gyeonggi	24	134733	5614
	Busan	10	48183	4818
	Daegu	6	37764	6294
	Gwangju	7	27674	3953
	Daejeon	6	37696	6283
	Ulsan	2	12146	6073
	Mean (SD)	12.8(11.2)	65663.4(55311.1)	5346.5(850.5)
	Rank	9.94	10.50	10.50
Rural/suburban	Gangwon	7	31783	4540
	Chungbuk	4	21947	5487
	Chungnam	8	38401	4800
	Jeonbuk	8	34190	4274
	Jeonnam	4	21672	5418
	Gyeongbuk	9	43492	4832
	Gyeongnam	6	26850	4475
	Jeju	5	16587	3317
	Mean (SD)	6.4(1.9)	29365.3(9213.0)	4642.9(687.3)
	Rank	7.06	6.50	6.50
U		20.5	16.0	16.0
P		.234	.105	.105

*'Metropolitan Cities' include designated metropolitan cities and the province of Gyeonggi.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

Rural-suburban areas are defined by areas other than the aforementioned areas.
** 41 regional emergency medical centers and 112 local emergency medical centers (102 in metropolitan areas, 51 in rural-suburban areas; 1 center in Busan not in operation).
***1 or more of the 28 designated severe emergency diagnoses at the time of discharge as per KCD-7(Korean standard Classification Disease and Cause of Death).

Table 3. Comparison between metropolitan and rural-suburban areas in the time to arrival at emergency center*

N=2816867

Type**	**Area**	**Emergency patients**	**Arrival within 30 minutes*****	**Arrival within 2 hours******	**Arrival within 4 hours*******
Large Cities	Seoul	699916	8.8 (61458)	24.2 (169091)	10.2 (71102)
	Incheon	185725	8.7 (16140)	32.5 (60449)	11.3 (21025)
	Gyeonggi	665566	8.5 (56243)	25.9 (172430)	11.8 (78655)
	Busan	104563	4.9 (5083)	37.2 (38906)	10.7 (11207)
	Daegu	117672	7.7 (9076)	23.0 (27035)	11.5 (13528)
	Gwangju	82967	8.6 (7120)	21.8 (18066)	12.8 (10610)
	Daejeon	103461	10.6 (11008)	25.0 (25881)	11.1 (11515)
	Ulsan	40984	7.4 (3053)	24.9 (10201)	12.3 (5034)
	Mean (SD)	250106.8(270178.4)	8.15(1.62)	26.81(5.27)	11.46(0.84)
	Rank	9.50	6.63	7.25	8.19
Rural/suburban	Gangwon	101852	8.6 (8739)	25.6 (26028)	11.9 (12161)
	Chungbuk	60002	12.2 (7321)	29.7 (17815)	10.1 (6079)
	Chungnam	132453	10.9 (14419)	27.9 (36908)	11.3 (15018)
	Jeonbuk	112244	8.1 (9094)	23.7 (26571)	11.6 (13012)
	Jeonnam	55757	10.6 (5906)	26.0 (14485)	12.3 (6853)
	Gyeongbuk	130685	10.8 (14081)	27.8 (36310)	11.71 (5275)
	Gyeongnam	140520	7.1 (9999)	25.7 (36131)	11.2 (15703)
	Jeju	82500	10.2 (8413)	27.8 (22913)	11.8 (9734)
	Mean (SD)	102001.6(32996.7)	9.81(1.71)	26.78(1.87)	11.49(0.66)
	Rank	7.50	10.38	9.75	8.81
U		24.0	17.0	22.0	29.5
P		.442	.130	.328	.798

* 41 regional and 112 local emergency medical centers sending information to NEDIS (metropolitan emergency cases 2,000,854, rural-suburban emergency cases 816,013; 1 center in Busan not in operation).
** 'Metropolitan Cities' include designated metropolitan cities and the province of Gyeonggi. Rural-suburban areas are defined by areas other than the aforementioned areas.
*** Percentage of patients who arrived at emergency medical center within 30 minutes of presentation of symptoms.
**** Percentage of patients who arrived at emergency medical center between 30 minutes and two hours of presentation of symptoms.
***** Percentage of patients who arrived at emergency medical center between 2 and 4 hours of presentation of symptoms.

Annals of R.S.C.B., ISSN:1583-6258, Vol. 25, Issue 1, 2021, Pages. 1233 - 1241
Received 15 December 2020; Accepted 05 January 2021.

Table 4. Comparison between metropolitan and rural-suburban areas in the transfer rates of severe emergency patients

Type*	Area	Transfer rate**	Primary transfer rate***	Re-transferrate****
Large Cities	Seoul	4.7 (6874)	4.7 (6060)	4.1 (1222)
	Incheon	3.6 (1624)	3.9 (1321)	2.5 (247)
	Gyeonggi	3.9 (7211)	4.4 (5590)	2.7 (1186)
	Busan	3.2 (1139)	2.6 (660)	3.0 (303)
	Daegu	5.5 (1603)	5.5 (1303)	5.0 (394)
	Gwangju	4.8 (855)	5.1 (768)	3.5 (205)
	Daejeon	2.5 (552)	2.8 (581)	1.5 (79)
	Ulsan	2.2 (269)	2.6 (200)	1.6 (68)
	Mean (SD)	3.80(1.16)	3.95(1.16)	2.99(1.20)
	Rank	5.56	4.50	7.31
Rural/suburban	Gangwon	4.2 (1301)	5.7 (1272)	2.6 (245)
	Chungbuk	5.0 (1142)	7.1 (1017)	3.0 (216)
	Chungnam	6.8 (3038)	11.1 (3057)	3.5 (354)
	Jeonbuk	5.0 (1661)	6.2 (1688)	3.5 (351)
	Jeonnam	6.2 (1878)	9.4 (1175)	4.8 (624)
	Gyeongbuk	4.9 (2482)	6.0 (1789)	4.4 (659)
	Gyeongnam	5.2 (2151)	6.4 (1541)	4.5 (704)
	Jeju	4.8 (803)	5.7 (899)	2.3 (61)
	Mean (SD)	5.26(0.83)	7.20(1.99)	3.78(0.92)
	Rank	11.44	12.50	9.69
U		8.5	0.0	22.5
P		.010	<.001	.328
1-β		58	55	

* 'Metropolitan Cities' include designated metropolitan cities and the province of Gyeonggi. rural-suburban areas are defined by areas other than the aforementioned areas.
** transfer rate=number of transfers / number of severe emergency cases ×100.
*** primary transfer rate = number of transfers / number of directly presented severe emergency cases ×100.
**** re-transfer rate= number of transfers / number of severe emergency cases transferred in from another center ×100.